



DATE: November 2, 2010

TO: US EPA Region 3

FROM: Bion Environmental Technologies, Inc.

RE: Comments on the Draft Chesapeake Bay TMDL [EPA Docket ID No. EPA-R03-OW-2010-0736]

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**Summary Statement:** The Chesapeake Bay models are the technical basis upon which EPA and state mandates for nutrient reduction are based. Unfortunately, these models are inaccurate as they relate to the quantification and impact from livestock waste. These errors prove costly to the rate/taxpayers that are paying the tab for this large scale remediation and they undermine the effectiveness of the effort.

**Technical Basis for Model Inaccuracy Statement**

- While EPA states that model data is available for public review and consumption, in reality this is not the case, at least in a detailed sense. However, Bion has assessed publicly available data on EPA's use of factors and assumptions related to Chesapeake Bay model inputs, and closely reviewed all available reports on this issue.
- Based upon our analysis, our interactions with regulators and scientists at the PA DEP and EPA, as well as hired experts, Bion has determined that EPA's Chesapeake Bay model does not accurately reflect nitrogen loss from livestock.
- EPA's model contains a large gap in nitrogen lost to the environment from the time the manure is voided to the time the manure gets land applied. Upon an evaluation of nitrogen lost to the environment on a mass balance (as voided) basis, there is a large gap in actual nitrogen loss versus what is modeled by EPA. In PA DEP's WIP for example, it was stated that nitrogen delivered load to the Bay from livestock manure was determined by nutrient loads calculated from the Penn State University Agronomy Guide. While this document has proven to be accurate in proper context, the numbers used in this agronomy guide only include nitrogen content of the manure as it is land applied. Therefore, it does not include the approximately 50% of manure nitrogen that volatilizes (primarily as ammonia) and is lost to the environment before land application. Further, Bion has been unable to clearly establish (despite inquiry to DEP and EPA personnel

and consultants) whether the nitrogen loss inventory from livestock was based upon a full inventory of livestock, or simply based upon the database of permitted CAFOs (which, in the Susquehanna Watershed represent a small portion of the total livestock herd).

- In practice and on average, 50% of the entire nitrogen content of the manure is lost prior to land application. This loss figure can easily be confirmed by calculating the nitrogen content of the manure as it is voided (or using standard factors from ASABE) and subtracting from that the nitrogen content of the manure as it is land applied, which is regularly measured pursuant to nutrient management planning needs. The difference approximates the amount of nitrogen lost as ammonia in the handling/storage process. This lost ammonia is not regulated, is not accounted for in farm nutrient management plans, and therefore apparently falls between the cracks of EPA's model.
- EPA recently published a report entitled "*Scientific Assessment of Hypoxia in US Coastal Waters*" in which the same as voided/as land applied gap in nitrogen quantification appeared to be embedded. This is not surprising since the Chesapeake Bay models are held up as the top watershed models in the US today. As a result, the problems (and costs) of the EPA's Chesapeake Bay model are being compounded as the methodologies are exported to other coastal waters, including the much larger Gulf of Mexico/Mississippi River Basin. Failure to correct these problems will undermine the possibility of successful, cost effective remediation not only in the Chesapeake Bay but throughout the U.S.
- EPA model categories do not lend themselves to accurate quantification of nitrogen loss via ammonia volatilization. The CAFO nutrient loss category in the EPA model is miniscule compared to actual losses from CAFOs because CAFOs are categorized as zero discharge facilities. The vast majority of nutrient losses from agricultural sources included in EPA's model are from cropping. This category does not include the massive amount of nitrogen loss via ammonia volatilization prior to land application. The EPA models lack any rigorous, science-based, mass balance analysis with respect to livestock nitrogen.

### **Ramifications of the Inaccuracies within EPA's Chesapeake Bay Models**

The EPA model may very well be correct for more urban regions (such as Baltimore and Washington DC) where human activity dominates the delivered load. The EPA's overall nitrogen delivered load inventory to the Chesapeake Bay from the Susquehanna Watershed may be correct, as that is a measured number. However, the source allocations in EPA's Chesapeake Bay model for Pennsylvania's Susquehanna Watershed are materially wrong due to the significant underestimation of the nitrogen loading from the livestock industry and downwind misallocations to other allocation

categories through which the livestock nitrogen (in dilute form) makes its way to the Bay .

The Susquehanna Watershed is unique in that its primary nitrogen loading is from livestock and not from human activity. The livestock industry in the Susquehanna watershed generates 300-350 million pounds of nitrogen annually based upon the latest USDA livestock census numbers once the airborne nitrogen component is added to the land applied portion. EPA models do not reflect the entirety of this loss.

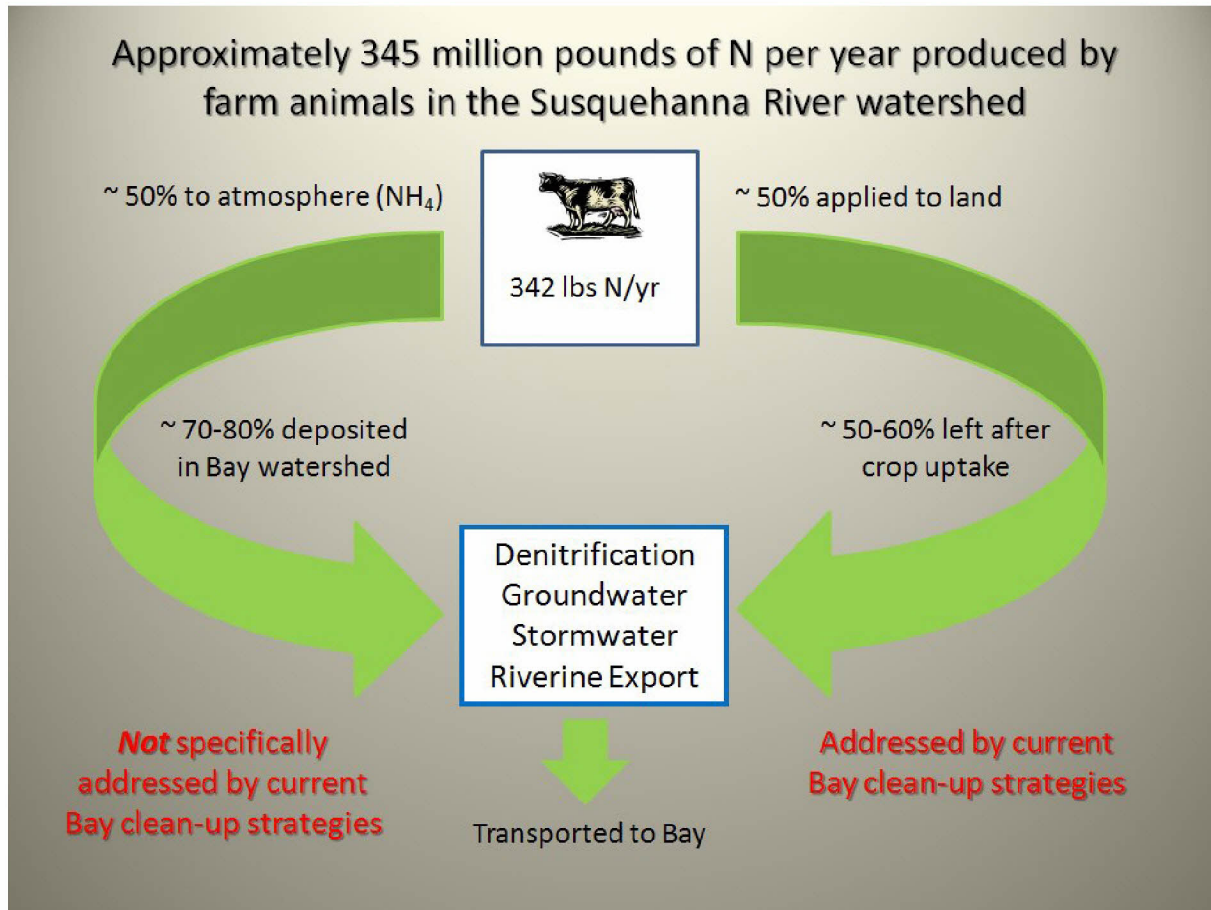
This is a costly error for rate/taxpayers within the Susquehanna watershed because funding/financing/regulation are all derived from model outputs. EPA's regulatory backstop/threat on Pennsylvania pursuant to the Draft WIP further compounds the problem by imposing costly and ineffective mandates that do not address the core problem and which are not adequately modeled.

A revised model that accurately reflects the nitrogen sources and allocations in the Susquehanna watershed would enable a WIP to be developed that would significantly reduce the mandated nitrogen compliance costs by securing those reductions primarily from the livestock producer industry.

Bion's projects at Kreider Farms in Manheim, Pennsylvania as well as the Energy Works project in Gettysburg will demonstrate an ability on the part of Pennsylvania to meet its mandated nutrient reductions primarily from its livestock producer industry at significantly less cost than the EPA regulatory backstop position. However, the inaccurate configuration of EPAs existing Bay model threatens to inappropriately force reductions from downstream conduit sources, such as storm water and forests. Such mis-focused reduction efforts will (and have in the past) create significantly greater costs to the tax and rate payers of Pennsylvania. The cost of the existing Chesapeake Bay mandate will be reduced by properly sourcing and allocating the livestock nutrient loadings. Additionally, clean-up at the source will provide significant environmental benefits to the local environments where these livestock operations presently exist including reductions in phosphorous,  $H_2S$ ,  $NO_x$ , pathogens, endocrine disrupting compounds and odor.

Table 1 below provides a visual description of the mass balance nitrogen loss pathway associated with livestock manure. The EPA's Bay model does not accurately quantify and allocate this pathway.

**Table I – Visual Representation of Nitrogen Accounting Gap in EPAs Bay Model**



## Conclusion

Before requiring Pennsylvania rate- and taxpayers to spend inordinate amounts of money that is not available through an ineffective regulatory back stop provision (based upon the load determinations and mandates outlined in the draft TMDL standard), EPA needs to review its modeled characterizations of nitrogen loss from livestock waste and ensure a full and accurate description is included. Once that is completed, then differing model results will highlight that a more cost-effective strategy that is also more friendly to the local environment, will be available.

It is imperative that the EPA model be vetted for accuracy with actual nitrogen flows associated with livestock manure before its results are imposed upon the citizens of the Susquehanna watershed.